

WHAT IS CLAIMED IS:

1. An evaluation system for vehicle operating conditions which is applied to a vehicle provided with an engine and a manual transmission connected to the engine, comprising:

a detection device which detects the operating conditions of the engine; and

a controller functioning to:

determine, on the basis of the operating conditions of the engine, whether or not the fuel economy of the vehicle would be improved by shifting the transmission upward from the current gear position to a gear position one step further toward a HIGH side; and

instruct a driver to shift the transmission upward when it is determined that the fuel economy of the vehicle would be improved by shifting the transmission upward.

2. The system as defined in Claim 1, wherein the detection device which detects the operating conditions of the engine comprises:

a detection device which detects a load of the engine; and

a detection device which detects a rotation speed of the engine,

the controller comprising a fuel consumption ratio map showing the relationship of a fuel consumption ratio to the rotation speed and load of the engine, and further functioning to:

calculate from the detected rotation speed and load of the engine a rotation speed and load of the engine following an upshift of the transmission;

calculate a current fuel consumption ratio of the engine from the detected rotation speed and load of the engine by referring to the fuel consumption ratio

map, and calculate a fuel consumption ratio following an upshift of the transmission from the rotation speed and load of the engine following an upshift of the transmission; and

instruct the driver to shift the transmission upward when the fuel consumption ratio following an upshift of the transmission is smaller than the calculated current fuel consumption ratio.

3. The system as defined in Claim 1, wherein the device which detects the operating conditions of the engine is a detection device which detects a rotation speed of the engine,

the controller comprising a fuel consumption ratio map showing the relationship of a fuel consumption ratio to the rotation speed and load of the engine, and

further functioning to instruct the driver to shift the transmission upward when the detected rotation speed of the engine is higher by a predetermined degree or more than a maximum rotation speed of a region on the fuel consumption ratio map in which the fuel consumption ratio is smaller than a predetermined value.

4. The system as defined in Claim 1, further comprising a detection device which detects a vehicle speed of the vehicle,

wherein the detection device which detects the operating conditions of the engine comprises:

the detection device which detects a load of the engine; and

the detection device which detects a rotation speed of the engine,

the controller comprising the fuel consumption ratio map showing the relationship of the fuel consumption ratio to the rotation speed and load of the

engine, and further functioning to:

- calculate a gear position of the transmission in which the fuel economy is most favorable when traveling on a flat road at the detected vehicle speed;

- calculate a load of the engine when traveling in the gear position in which the fuel economy is most favorable; and

- instruct the driver to perform an upshift when the detected load of the engine is lower than the engine load when traveling in the gear position in which the fuel economy is most favorable, and when the detected rotation speed of the engine is higher by a predetermined degree or more than the maximum rotation speed of the region on the fuel consumption ratio map in which the fuel consumption ratio is smaller than a predetermined value.

5. The system as defined in Claim 1, wherein the detection device which detects the operating conditions of the engine is the detection device which detects the rotation speed of the engine,

- the controller further functioning to:

- set an upshift instruction rotation speed gradually lower as the gear position of the transmission moves further toward a LOW side; and

- instruct the driver to shift the transmission upward when the detected rotation speed of the engine is higher than the upshift instruction rotation speed.

6. The system as defined in Claim 1, wherein the detection device which detects the operating conditions of the engine comprises:

- a detection device which detects a load of the engine; and

- a detection device which detects a rotation speed of the engine,

- the controller comprising a fuel consumption ratio map showing the

relationship of a fuel consumption ratio to the rotation speed and load of the engine, and further functioning to:

set an upshift instruction line on the fuel consumption ratio map which passes through a point of intersection between a maximum torque line of the engine and a line indicating the torque required to travel on a flat road in the gear position which is furthest toward the HIGH side, and which contacts a region in which the fuel consumption ratio is smaller than an allowable value; and

instruct the driver to shift the transmission upward when an operating point of the engine, which is determined by the rotation speed and load of the engine, is further toward a high rotation speed side or a low load side than the upshift instruction line.

7. The system as defined in Claim 1, wherein the detection device which detects the operating conditions of the engine is a detection device which detects a rotation speed of the engine,

the controller comprising a fuel consumption ratio map showing the relationship of a fuel consumption ratio to the rotation speed and load of the engine, and further functioning to:

set an upshift instruction line on the fuel consumption ratio map which passes through a point of intersection between the maximum torque line of the engine and the line indicating the torque required to travel on a flat road in the gear position which is furthest toward the HIGH side, and which contacts the region in which the fuel consumption ratio is smaller than an allowable value;

set a point of intersection between the upshift instruction line and the line indicating the torque required to travel on a flat road in each gear position as an upshift instruction rotation speed for each gear position; and

instruct the driver to shift the transmission upward when the detected rotation speed of the engine is higher than the upshift instruction rotation speed in the current gear position.

8. The system as defined in Claim 1, further comprising a display device connected to the controller,

wherein the detection device which detects the operating conditions of the engine comprises:

a detection device which detects a load of the engine; and

a detection device which detects a rotation speed of the engine,

the controller comprising a fuel consumption ratio map showing the relationship of a fuel consumption ratio to the rotation speed and load of the engine, and further functioning to:

calculate the fuel consumption ratio of the engine based on the detected rotation speed and load of the engine by referring to the fuel consumption ratio map;

calculate a fuel consumption amount of the engine based on the calculated fuel consumption ratio; and

display at least one of the calculated fuel consumption amount and the fuel economy which are calculated from the calculated fuel consumption amount on the display device.

9. The system as defined in Claim 8, wherein the controller further functions to:

determine variation in the current fuel consumption ratio in relation to an initial fuel consumption ratio of the engine; and

on the basis of the variation in the fuel consumption ratio, correct at least one

of the fuel consumption ratio map, the calculated fuel consumption ratio, and the calculated fuel consumption amount.

10. The system as defined in Claim 1, further comprising a display device connected to the controller,

wherein the detection device which detects the operating conditions of the engine comprises:

a detection device which detects a load of the engine; and

a detection device which detects a rotation speed of the engine,

the controller further functioning to:

depict an operating frequency at each of the operating points of the engine, which are determined by the rotation speed and load, on a two-dimensional map on which a first axis is set as the engine rotation speed and a second axis is set as the engine load; and

display the two-dimensional map on the display device.

11. The system as defined in Claim 10, wherein the controller further functions to depict the operating frequency on the two-dimensional map using color variation in accordance with the greatness of the frequency.

12. The system as defined in Claim 1, further comprising a display device connected to the controller,

wherein the controller further functions to:

determine whether or not a driving operation which worsens the fuel economy has been performed;

when it is determined that an operation which worsens fuel economy has

been performed, respectively calculate an actual amount of consumed fuel and an amount of fuel which would have been consumed had the operation which worsens fuel economy not been performed;

calculate an amount of fuel consumed in excess due to the operation which worsens fuel economy by subtracting the amount of fuel which would have been consumed had the operation which worsens fuel economy not been performed from the actual amount of consumed fuel; and

display the calculated excess fuel consumption amount on the display device.

13. An evaluation system for vehicle operating conditions used in a vehicle provided with an engine, comprising:

a detection device which detects a load of the engine;

a detection device which detects a rotation speed of the engine;

a display device; and

a controller comprising a fuel consumption ratio map which shows the relationship of the fuel consumption ratio to the rotation speed and load of the engine, and functioning to:

calculate a fuel consumption ratio of the engine based on the detected rotation speed and load of the engine by referring to the fuel consumption ratio map;

calculate a fuel consumption amount of the engine based on the calculated fuel consumption ratio; and

display at least one of the calculated fuel consumption amount and the fuel economy which are calculated from the calculated fuel consumption amount on the display device,

the controller further functioning to:

determine variation in the current fuel consumption ratio in relation to an

initial fuel consumption ratio of the engine; and

on the basis of the variation in the fuel consumption ratio, correct at least one of the fuel consumption ratio map, the calculated fuel consumption ratio, and the calculated fuel consumption amount.

14. An evaluation system for the operating conditions of a vehicle provided with an engine, comprising:

a detection device which detects a load of the engine;

a detection device which detects a rotation speed of the engine;

a display device; and

a controller functioning to:

depict an operating frequency at each of the operating points of the engine, which are determined by the rotation speed and load, on a two-dimensional map on which a first axis is set as the engine rotation speed and a second axis is set as the engine load; and

display the two-dimensional map on the display device.